ENVIRONMENT ONTARIO **LEGACY**

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A TRADITIONAL RIBBON-CUTTING ceremony marked the official opening of the Duffin Creek sewage treatment plant. Key participants, from left, were Harry C. Parrott, Ontario minister of the environment; Walter Beath, chairman of the Regional Municipality of Durham; William G. Davis, premier of Ontario; Robert Forhan, chairman of the Regional Municipality of York, and Paul Cosgrove, federal minister of public works. (photo: Hans Eijkenek)

Two unique treatment systems improve Ontario water quality

Two large projects developed by Environment Ontario were officially opened in October: the first stage of the York-Durham Water Pollution Treatment System and the Lorne Park Water Purification Plant.

The York-Durham Water Pollution Treatment System, under construction since 1975, is the largest single project undertaken by Environment Ontario and the largest single planned sewage system in Canada. The Lorne Park Water Purification Plant is North America's first major underground water treatment plant.

time capsule buried

The $300 million York-Durham system is designed to serve the present and future needs of the Regional Municipalities of York and Durham and their population, expected to grow to 800,000 by the end of the century. It also is, as Ontario Premier William Davis said at the opening, "a tangible expression of Ontario's confidence in its own dynamic future."

Both York and Durham, "can look forward to a rapid but orderly, planned growth because the essential services are in place now."

"The facility will improve the quality of the water in the Rouge, Holland and Don Rivers and in Duffin Creek by producing a better effluent for discharge into Lake Ontario," Environment Minister Harry C. Parrott said during the ceremony at the Duffin Creek treatment plant in Pickering.

A feature of the opening ceremony, attended by about 350 municipal councillors and representatives of commerce and industry, was the commemorative sealing of a stainless steel time capsule by Premier Davis. The capsule is to be opened in the year 2030.

It contains bound volumes of photographs depicting the region as it looks today, an account of the development of the pollution control system, official documents relating to the project and a guest book signed by guests at the ceremony.

"Parrott Troopers" to clamp down on illegal dumping

A special environmental police unit of 13 men trained in investigative techniques has been established to crack down on illegal dumping of industrial wastes and other unusual forms of pollution, Environment Minister Harry C. Parrott announced in the Legislature.

Amendments to environmental legislation, to be introduced this fall, will establish minimum fines for illegal handling and dumping of industrial waste and will empower the ministry to seize vehicles involved in such activity.

In addition, two lawyers will be added to the ministry's legal services branch to handle the increased number of prosecutions and control orders.

The special investigation unit will carry out spot audits and special checks of industrial, commercial and municipal records and activities.

"A large part of the unit's work will involve investigations into illegal dumping of liquid industrial waste," the minister said. "If there are any midnight haulers around, this unit will be out to nail them." The unit will take charge of investigations into illegal dumping, gather evidence for prosecution and will investigate unusual complaints.

The decision to expand the ministry staff during the current period of constraint is based on a dramatic increase in demand for abatement and surveillance as the ministry steps up its control programs.

The unit will serve all areas of the province but staff will be concentrated in areas of high population and industrial density. Its duties will include: policing and enforcement of selected ministry orders and abatement programs; co-ordinating teams of engineers and scientists in investigations; special prosecutions; monitoring of ministry certificates of approval; waybills and environmental assessment procedures; examination of company records; interviews with complainants and witnesses.

Dioxin lab on stream

A $275,000 laboratory equipped to detect minute quantities of dioxin, a dangerous contaminant, was opened recently by Environment Minister Harry C. Parrott at the ministry's main laboratory building in Etobicoke.

Construction of the highly complex facility was started last year when concern was raised about a possible contamination of Lake Ontario fish by dioxin.

Before the official opening, laboratory staff screened about 60 water samples from the Niagara Peninsula, but no dioxin was found in these specimen. Testing will be extended to fish from the Lake Ontario, Erie, St. Clair and Superior. *(see also story on pg. 3)*

It's all one world...

US chemical industry reports on waste dumping

Some 94 per cent of the wastes generated by the 53 largest chemical manufacturers in the U.S. since 1950 remain on the company sites where they were generated, reveals a survey undertaken by a subcommittee of the U.S. House of Representatives in co-operation with the U.S. Chemical Manufacturers Association.

Many of the sites currently used for disposal, however, would not qualify for permitted disposal under regulations proposed by the EPA.

About 400 sites have been closed and sold to new owners. Many sites, the report states, contain wastes with chemical compounds known to pose potentially serious hazards to public health and the environment.

The chemical industry claimed its members are directly responsible for only 17 per cent of all industrial waste, and that the control of disposal sites should be given to individual states and not to the EPA.

As a participant on the survey, the chemical manufacturers complained that proposed regulations for the disposal of hazardous chemicals do not recognize a "degree of hazard". The regulations would be so stringent that even Coca Cola would qualify as hazardous.

The E.P.A. pointed out in connection with the report that it has already identified in the U.S. 1,500 sites on which industrial wastes were dumped and that it has inspected about 500 of them.

EPA recalls nitrite warning

Two years after declaring that nitrites carried a risk of cancer to humans, the U.S. Food and Drug Administration has reversed its plans to phase out their use as meat preservatives.

The 1978 warning on the use of nitrites was based on a report by Paul Newberne of the Massachusetts Institute of Technology, that nitrite-eating rats had a greater than normal incidence of cancer. A painstaking review of the findings by university researchers, however, led to a report that questioned Newberne's laboratory procedures, statistical methods and pathological data.

Many of the 50,000 tissue slides used to demonstrate the danger of nitrites actually showed non-cancerous lesions and a type of cancer that is found in rats but not in humans.

Despite the F.D.A. policy reversal, William Lijinsky of the Maryland Cancer Research Institute warns that nitrites still pose a risk of cancer because they might combine in the body with amines to form cancer-causing nitrosamines. The F.D.A. agreed, that there are still questions left unanswered and has asked the U.S. National Academy of Sciences to review all existing data.

Pennsylvania sues EPA

The Department of Environmental Resources of Pennsylvania is suing the U.S. Environmental Protection Agency for allowing two coal-fired plants near Cleveland to emit SO_2 at four to five times the allowed rate. The E.P.A. has proposed to exempt the plants from existing standards.

This action, the Pennsylvania authority claims, does not consider the effect of the emissions on downwind states. It also makes it difficult for several areas of western Pennsylvania to maintain national air quality standards.

No environmental assessment in England

The British government opposes in principle plans to introduce environmental assessment legislation as demanded by the European Economic Community, reports the New Scientist. Even a toned-down version of the European legislation, an undersecretary of the British Department of the Environment said, would lead to time-consuming litigation at public planning inquiries.

British industrialists argue that the assessment requirements of the U.S. Environmental Protection Act have slowed or stopped many new oil drilling and dam construction projects in the U.S. and that industrial development in Britain would be unfairly inhibited by similar legislation.

Zeolites promise miracle cures

What can:

sift high level radioactive isotopes from nuclear waste,

replace phosphate in detergents without polluting water,

soften water, purify gases and remove unwanted odors,

improve the health of farm animals,

grow better crops,

act as a drying agent,

make gasoline from coal?

Dr. A. Dyer of Salford University claims that these and many other jobs can be done by zeolites, alumino-silicates that occur naturally in basaltic rocks. Zeolites act as crystalline molecular sieves. As such they can exchange ions in solutions. Regular porous channels in their structure also allow small molecules to pass through freely while larger ones are trapped.

Up to now, 60 different types of zeolites with varied abilities to separate good from bad are found in nature. Many more can be made synthetically with structures tailored to a wide variety of tasks.

Never heard of INCO

In answer to complaints about stench in the vicinity of brickworks in Bedford, England, the authorities are planning to compell the offenders to build higher chimneys to cut down on pollution at ground level, reports the New Scientist. Existing chimneys emit a mixture of sulphur dioxide and mercaptans.

Peregrines return

After being forced out of the craggy Manhattan skyscrapers by DDT in the 40's, peregrine falcons may return to their habitats among the tall buildings. Ornithologists from Cornell University have placed three falcon chicks in a special cage on the roof of the Manhattan Life Insurance Building and hope that they will eventually establish themselves.

The ornithologists believe that the ban of DDT in 1972 has now made the big city environment safe for a new generation of the bird that was close to extinction in the eastern U.S.

Lemon rind is the culprit

Drinking lemon tea from polystyrene cups may not only be barbaric but dangerous to health, report the British New Scientists, pointing out that polystyrene may be carcinogenic, and lemon tea has a tendency to dissolve it.

A flurry of research activity caused by the report has revealed, that the culprit was not tea nor lemon juice, but d-limonene, contained only in lemon (or orange) rind, and that polystyrene is not carcinogenic.

To be perfectly safe, tea drinkers should therefore remove the rind from the lemon before popping a slice of it into their tea — or, much better — consume the tea from china cups.

EPA limits chloroform

The content of chloroform and other trihalomethanes in drinking water is limited by a new Environmental Protection Agency regulation to 100 parts per billion. The compounds, suspected carcinogens, are products of water chlorination.

To achieve these limits, many of the 515 U.S. water treatment systems using chlorination will have to modify their procedures, mostly by changing the point at which chlorine is added to the water.

DDT lingers on..

Nearly 10 years after the ban of DDT's the wildlife in Wheeler National Wildlife Refuge in Alabama still shows very high DDT concentration in its muscles. DDT residues in the wings of Alabama waterfowl are the highest in the U.S., and ducks that have spent the winter in the refuge suffer from impaired reproduction on their breeding grounds as far as Ontario.

The number of fish eating birds in the refuge is still on the decline. Bald eagles have not bred since 1940, mixed species herons do not reproduce and the once plentiful double crested cormorant is now seen rarely.

A stream in the refuge is estimated to still contain about 4 million kilograms of DDT it received from a factory that closed a decade ago after 24 years of operation.

Ministry of the Environment
Ontario

Hon. Harry C. Parrott, D.D.S., Minister
Graham W.S. Scott, Q.C., Deputy Minister

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Dioxins...

Searching for a gnat's wing

by Robert Koci

The search is on for dioxins in Environment Ontario's newest specialized laboratory. It is a search for the most dangerous poison known to man.

The aim of the search is to detect such minute quantities of the rare material that Gerry Rees, head of Environment Ontario's new research unit, compares his job to the detection of a gnat's wing in the carcass of a 100-ton whale.

Dioxins is the designation used for a group of 75 chemicals of the chlorodibenzoldioxin family. One member of the group, 2,3,7,8 tetrachlorodibenzodioxin — TCDD for short — is extremely dangerous. Only 4.2 micrograms — a quantity invisible to the naked eye — can kill an adult. Much smaller doses have caused acne, have damaged livers, hearts, spleens, central nervous systems, the pancreas, brains and lungs and can cause birth defects. The material will pass through skin to do its work on human or animal bodies.

The compound 2,3,7,8 TCDD is 500 times more lethal than strychnine, and 1,000 times more lethal than cyanide. Other members of the dioxin family are much less dangerous.

unwanted by-product

TCDD is not manufactured anywhere in the world on purpose, except in a few research laboratories. It is — as are the other members of the family — an unwanted by-product of the manufacture of some chemical compounds, or of the incineration of organics.

In 1979, a specially equipped laboratory at the University of Nebraska detected very small amounts of TCDD in one of six fish caught in Lake Ontario. The laboratory was unable, however, to specify whether the TCDD discovered was of the highly toxic variety.

Environment Ontario scientists did not have at that time the tools needed to confirm or disprove the findings. Environment Minister Harry C. Parrott decided, therefore, to establish a laboratory able to detect reliably and independently even the smallest amounts of the contaminant.

one second in 30,000 years

The presence of dioxins is measured in parts per trillion, a quantity that defies imagination. The conventional yardstick for contaminants, parts per million, is easier to visualize. One part per million corresponds to about one second out of about eleven days, or one Kg of sugar dissolved in a three storey high, 10 m (33 ft.) wide and 10 m long swimming pool.

The less frequently used yardstick of one part per billion can be visualized as one second in 30 years, or one Kg of sugar dissolved in the contents of four supertankers of 250,000 tons capacity each.

One part per trillion corresponds approximately to one second in 30,000 years, or to one Kg of sugar dissolved in the contents of 4,000 supertankers of 250,000 tons capacity each. Or, very approximately, to one very small wing of a very small gnat in a very big, 100-ton whale.

When dioxin is present even in such small amounts it may accumulate and effect human or animal health.

produced naturally

In 1978, researchers at Dow Chemical claimed that TCDD is also produced naturally by the burning of certain chemical wastes as fuels. If this discovery is confirmed — and the Environment Ontario new laboratory will be able to do so — the probability that TCDD may find its way into the environment and eventually the foodchain is increased considerably.

At the new Environment Ontario laboratory, TCDD will first be sought in samples of untreated water and in fish. Once the method is well established, the search will be expanded to other materials among the fly-ash. Fly-ash is a product of combustion processes that may generate TCDD.

TCDD has some chemical similarities to PCBs and the method established at the laboratory for its detection starts out similarly to the method used for the detection of PCBs in fish. A piece of fish muscle is pulped and dissolved in a digester selected for its ability to keep organic molecules intact. The resulting opaque liquid organic material is extracted by the use of hexane. The extract may contain a large number of organic pollutants mixed with fish oil and other natural chemicals.

This mixture is then passed through a series of four separation columns packed with different materials. These columns extract from the sample:

1. all lipids and oils.
2. PCBs and pesticides.
3. sulphur compounds and unsaturated hydrocarbons.
4. DDT, DDE and PCBs that may have passed through the second stage filtering.

This process eventually leaves a small drop (80 microlitres) of clear liquid that may or may not contain dioxins. One-tenth of this cleaned sample is injected into a high pressure liquid chromatograph. This piece of equipment is essentially a highly efficient separation device. The sample, dissolved in methanol, is pushed through at 1,600 psi by a methanol stream.

gas chromatography

A partial separation of tetrachlorinated dioxin isomers is achieved in the instrument in a 50 cm long tube of 0.5 m diameter. The inside of the tube is packed with an adsorbent. The 2,3,7,8 TCDD isomer emerges from this tube along with six other tetrachloroisomers approximately six minutes after injection.

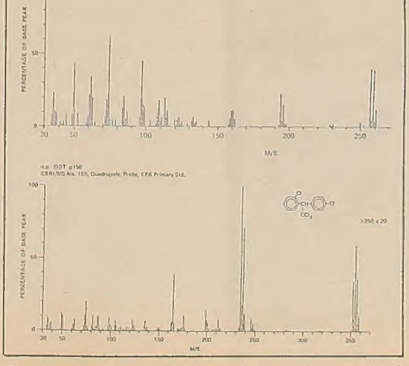
The methanol, containing the tetraisomers, is extracted with hexane and the extract is evaporated to ten microlitres. A small portion of this extract is screened on a gas/liquid chromatograph.

The gas/liquid chromatograph consists essentially of a 25 m capillary tube, the inside of which is coated with a chemical that can retain some compounds longer than others.

The time of retention separates the components of the sample passing through, and each individual component can be distinguished by the retention time. TCDD emerges from the capillary tube 10.7 minutes after injection into the front of the column, is detected by an electron capture detector and reported to a computer. The computer transforms the data into a visible signal — a peak on a graph.

There are, however, many other compounds that take the same time to pass through the tube as TCDD. The graph only shows whether the sample is free of TCDD, or whether another step should be taken to confirm the presence of the material.

For this confirmation, a second portion of the original sample is injected into a combined gas chromatograph/mass spectrometer. The first part of the process is identical with the process described. In the second stage, however, the molecules of the compound emerging from the capillary tube are fragmented by an electron beam.



The top graph shows the typical electron fragmentation fingerprint of 2,3,7,8 TCDD. The bottom graph shows the DDT fingerprint for comparison.

in sterile gowns

The fragmentation produces a unique and typical "fingerprint" of the molecule. It is registered as a mass spectrum on a separate graph. This graph can be precisely and positively identified. Computer processing of the graph also gives details of the amount of the material sought in the sample.

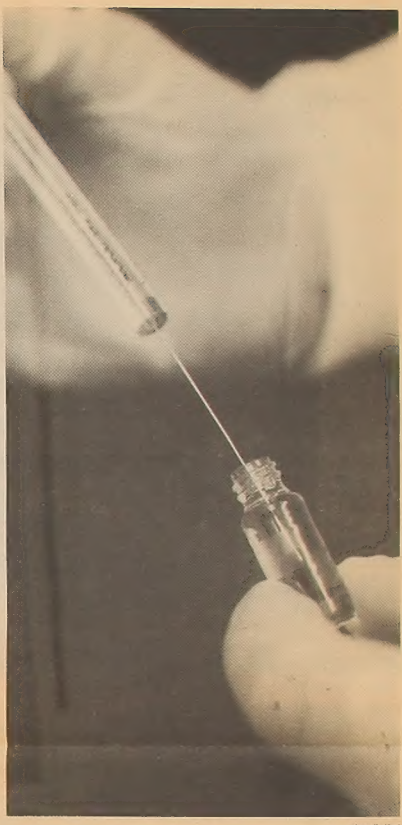
At the start of lab operations the equipment was tested by running either "blank" samples of clear water through it, or material containing a known amount of TCDD. The instruments worked, after proper calibration, very well.

The perfect operation of the equipment, however, does not alone guarantee success. To determine such minuscule amounts of materials, the whole laboratory including all the vessels, syringes, the piping, filters, etc., must be kept constantly in a super-clean condition.

Scientists and technicians work in white sterile surgical gowns and use sterile, disposable surgical gloves. An elaborate safety and cleaning procedure, more than equal to the procedures used in surgical operating rooms, has been established.

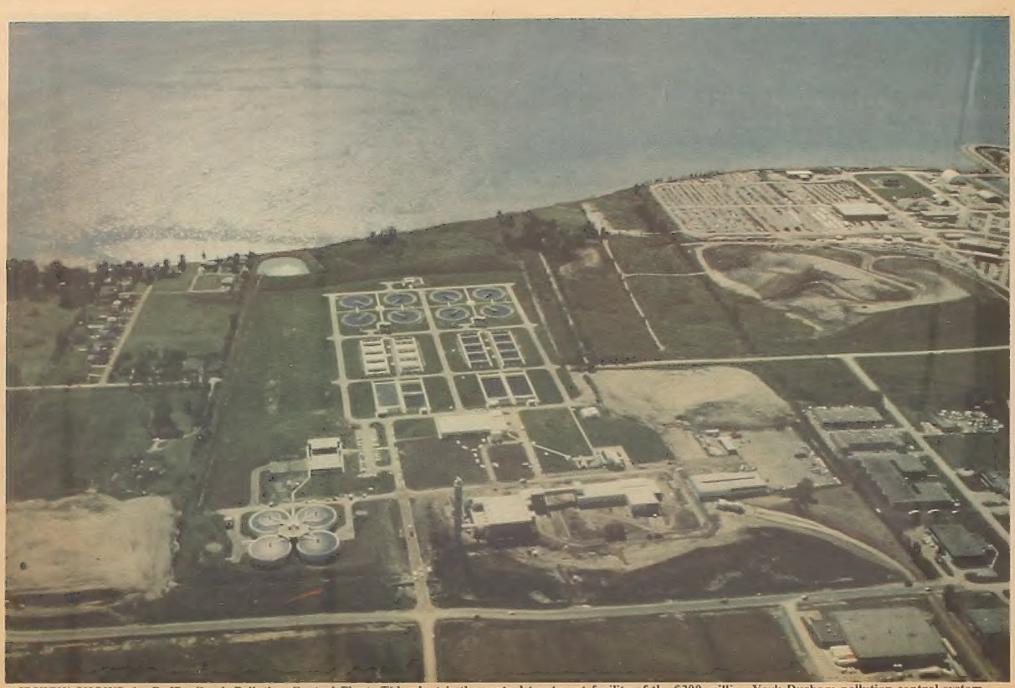
The laboratory itself is located in a remote and isolated basement area of the ministry's laboratory building. A good part of the cost allocated to its establishment has been spent on the construction of an independent air supply system that filters all incoming and — more importantly — all exhausted air to the most exacting standards.

The scientists and technicians work in the new laboratory under the direct supervision of Helle Tosine, Environment Ontario scientist, and of Gerry Rees, manager, pesticides section of the laboratory services branch. They are well aware of the dangers involved in the handling of the most potent poison known to man.



(photo R. Koci)

The handling of even minute quantities of material contaminated with dioxin calls for extraordinary care.



AIRVIEW SHOWS the Duffin Creek Pollution Control Plant. This plant is the central treatment facility of the $300 million York-Durham pollution control system.

TIME CAPSULE is sealed at official opening of the York-Durham Pollution Control System. Participants, from left, are Premier William Davis, Robert Forhan, chairman of the Regional Municipality of York; Harry C. Parrott, Ontario minister of the environment, and Walter Beath, chairman of the Regional Municipality of Durham. Time capsule contains historical records of the area.

(photos: Hans Eijsenck)

York Durham

Duffin Creek plant will serve 800,000

The Duffin Creek sewage treatment plant provides primary and secondary treatment through the activated sludge sewage treatment process with phosphorus removal.

Screenable material in the raw sewage is removed by mechanically cleaned screens and the heavy grit is settled in grit tanks. Suspended matter in the sewage is removed, following screening and grit removal, by holding the sewage for about three hours in primary settling tanks.

Effluent from the primary settling tanks is treated further by an aerobic biological or activated sludge process, whereby the liquid is aerated for six to seven hours. Following this, masses of aerobic or activated sludge material developed during aeration are settled out in secondary clarifiers.

Most of the settled activated sludge is returned by pumps to the head of the aeration tanks. The balance is taken off for incineration. The clarified liquid, or treated effluent, decanted from secondary clarifier tanks, is chlorinated before discharge. Alum or an iron salt is added to the effluent to remove phosphorus.

Sludge, the by-product of the treatment processes, is treated by an anaerobic biological process in airtight heated tanks for about 30 days at a temperature of approximately 35°C. The digested sludge is dewatered by filters. The dewatered cake is incinerated in fluid bed incinerators. The by-product, sludge gas, is used to fire boilers generating steam for plant heating.

Treated water from the plant is discharged through a ten-foot pipe reaching 3,600 feet out under Lake Ontario.

In the first stage of construction, a good part of the collection sewer (from Duffin Creek to Yonge St.) has been completed. The completion of the project will also allow phasing out of the Liverpool Road, Pickering and Ajax plants. Some time this year or early next year, the Markham, Unionville, John Street, North Don, Richmond Hill and West Don Water Pollution Control Systems will be taken out of the stream.

Previously the effluent from these plants was pumped into the Don and Rouge Rivers and into Duffin Creek. An improved effluent from the Duffin Creek System is now discharged into Lake Ontario which has a much larger capacity to maintain its ecological balance.

Over the next 20 years, the remaining 35 miles of the 70-mile trunk sewer will be extended through the regions of York and Durham.

The total system will collect sewage wastes from the Towns of Vaughan, Markham, Richmond Hill, Aurora, Newmarket, Pickering and Ajax for treatment in the new Duffin Creek plant.

The major trunk system depends mostly on gravity flow. Only a few

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South Peel

Lorne Park — the invisible plant

"Getting here is the most difficult thing about this opening. You could drive around for an eternity before finding the place," Environment Minister Parrott said at the opening of the Lorne Park Water Purification Plant.

The entire $22.6 million plant lies under the 34-hectare Jack Darling Park in the Regional Municipality of Peel.

The award-winning and unique underground concept allows Mississauga residents the full use of the park without contending with a government utility.

But even more important than the aesthetic quality are the energy savings provided by the construction method, Dr. Parrott said. Although it does not have fences, the plant is practically vandal-proof. "And its concept followed the ideals of our own environmental assessment legislation long before it became law," Dr. Parrott said.

The plant is part of the South Peel Water Supply System. It serves the western half of the Regional Municipality of Peel. The entire system is underground and will be remotely controlled by computer in 1982.

Water from Lake Ontario enters the plant through a 1,800-millimetre diameter intake tunnel which begins 1,200 metres into the lake. It continues 365 metres through a 2,400-millimetre diameter onshore intake pipe to the low-lift pumping station. There, chemicals are added for disinfection and process control.

The water flows to the flocculation stage where particles called floc are produced. The floc is removed from the water by a filtering system.

The water is then purified further by eight filtering units. The major components of the gravity filters are the underdrain system, the surface water wash, the wash trough and a straining system. The filtering media consist of layers of finely graded sand and anthracite coal.

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TRADITIONAL TOAST, at official opening of Lorne Park water purification plant, is offered by Harry C. Parrott, Ontario minister of the environment, and Margaret Marland, a member of Mississauga City Council. The beverage was purified water.

Water and sewage treatment — a history of achievement

The York-Durham waste water treatment system and the Lorne Park water purification plant are milestones in Ontario's 25-year $5 billion quest to clean up its water resources.

There are now 360 publicly owned waste water treatment plants in operation in the province, most of them offering secondary treatment and many of them also providing tertiary treatment or phosphorus removal. They handle together over 1 billion Imperial Gallons of sewage daily.

Of the total, the province operates 213 facilities, mostly in smaller municipalities that are unable to afford the full cost of adequate treatment. Municipalities operate 147 facilities handling 74 per cent of the total waste water treatment capacity in the province. Communal waste treatment systems now serve 94 per cent of Ontario's urban population or 82 per cent of the total population.

In response to the Canada-US Great Lakes water quality agreement Ontario has installed phosphorus removal in 214 sewage treatment plants discharging their effluent into the Great Lakes and other recreational waters.

A total of 429 publicly owned water systems distribute daily 2 billion Imperial Gallons of first rate drinking water to the Ontario population and to some industries. Communal water systems now deliver drinking water to 98 per cent of Ontario's urban population or 85 per cent of the province's total population.

The provision of adequate sewage and water treatment in Ontario is an ongoing project. The existing facilities are being continuously updated to meet the growing demand.

To help municipalities the ministry provides financial support for water and sewage systems in the form of direct grants of 15 per cent for major works and up to 75 per cent for high cost projects in small communities. Both programs provide a highly effective solution to communal sewage and water problems in the province.

But Ontario has not always been North America's most advanced jurisdiction in the treatment of wastes and of water. At the turn of the century, rapid growth and industrialization had given rise to a number of water pollution problems, the most pressing of which was the spread of waterborne diseases. Between 1911 and 1930 the Ontario Department of Health registered 45 typhoid epidemics in the province. Today, typhoid from municipal water supplies is unknown

The construction of water treatment — chlorination — and primary sewage treatment facilities brought some results. Typhoid mortality per 100,000 population decreased in Ontario from 7.3 in 1921 to 2.3 in 1930 and to 0.7 in 1940. Today, typhoid caused by water borne bacteria is virtually unknown in Ontario.

During the war years municipal treatment facilities, neglected during the depression, degraded further as neither materials nor manpower were available for improvements.

The situation was aggravated in the immediate post-war years by Ontario's industrial boom and mushrooming population. Municipalities reacting to this development concentrated on the provisions of water supply, while neglecting sewage treatment. By 1955 nearly all convenient Ontario surface water courses were — by today's standards — open sewers.

The situation was brought to a head by a serious water shortage in southwestern Ontario, the area that bore the brunt of the post-war growth. To find a solution to the difficulties, the Ontario government established the Water Resources and Supply Committee in 1955.

The committee demanded a crash water and sewage works program to be undertaken over the following ten years at a cost of $1 billion for water works and $1.3 billion (in 1956) dollars for sewage treatment in the province.

To help municipalities do the job, the Ontario Water Resources Commission was established in 1956.

At the time only 249 Ontario municipalities had mostly inadequate primary sewage treatment plants. There was no sewage or water treatment at all in 14 cities, 42 towns and 13 other larger municipalities. In 30 towns, 67 villages and 21 other smaller communities only water was treated.

In 15 years of operation, the commission established a program of water management and pollution control and a record of achievement that were examples to the world. In fact, by the establishment of the Commission, Ontario became one of the world's first jurisdictions to develop a pro-

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A PLACE TO PLAY: Laurie Brown finds a perfect place to play on the lake Ontario shore west of Toronto. Underneath the sand, and the turf leading up to it, is the underground Lorne Park water purification plant.

Recycling:

Most of your new car has been around before

Environment Minister Harry C. Parrott and Donald J. McIntosh, GM engine plant manager, discuss recycled engine blocks on the St. Catherine plant assembly line.

The new products of North America's car manufacturing industry appearing in dealers' showrooms may look very different from the 1970 models. But, deep down, the old heap you pushed around in your youth and the 1981 models have much in common: most of the metal used in their manufacture may be the same.

The North American auto industry is one of the industries most involved in the recycling of metals.

As much as 90 per cent of the engine, the drive train, the front suspension and of other essential components consists of recycled metal — metal that has already been used as a car component, a food tin, in a lawnmower or in any of the thousands of metal implements we need daily.

90 per cent of every engine

Of the remainder of your car, only upholstery, tires, wire insulation material, plastic trim and similar components are made from virgin material. Body panels are shaped by car manufacturers from sheet metal, and in sheet metal production as much scrap metal as possible is also used.

Two of the larger North American car manufacturers operate their smelting — and recycling — ovens in the U.S. and use material collected south of the border to feed their furnaces.

American Motors operates a foundry in Sarnia and manufactures in an adjoining plant engine blocks for its cars.

By far the largest Canadian car manufacturer's recycling operation, however, can be found in the General Motors plant in St. Catharines.

This plant can smelt about 3,500 tons of metal per day. Out of this metal, car engines, transmissions, drive trains, axles and other components are provided — and nearly all of the metal used in this production is recycled.

ironing irons and lawnmowers

Some of this recycled metal consists of trimmings, stampings and scrap from punching operations in General Motors' own shop. The other part of the recycled materials, however, has been used before.

It consists of steel scrap from Ontario junk yards, including engine blocks and other massive car parts, and of pressed bundles that may contain anything made of steel and iron — your mother's former ironing iron, the lawnmower you threw out because it didn't do its job, or the tin cans you separated from your kitchen waste and delivered to your neighborhood recycling depot.

Mixed with limestone and coke

Some of this material is delivered to the GM plant from the SWARU recycling plant in Hamilton or from Environment Ontario's Downsview resource recycling plant. Only a half to one per cent of the total metal used consists of pig iron or new metal.

All of it ends up in one of the plant's large furnaces. Here it is mixed with limestone, coke and other ingredients to be melted into new raw material.

The process is closely controlled. Samples of the molten metal are taken every half hour and metallurgically analyzed.

According to data obtained during these tests, precise amounts of silicone, manganese, chromium and other additives are added to bring the molten iron up to standards.

The molten iron of correct composition and temperature is poured into castings to be transformed in a number of steps into engines, drive trains, gear boxes and other components or any one of the numerous cast parts that make up your new car.

Ultrasonic tests assure quality

During the manufacturing and assembly ultrasonic tests make sure that only faultless components are used.

Generally it takes only 24 hours to transform the scrap metal collected in large heaps behind the foundry to a new engine purring smoothly on the final testbed — and maybe another day or so until this engine is fitted into the body of a car ready to start on its way to the customer.

Bruce Ried, GM plant engineer and Bob Green, melting superintendent, serve as yardsticks to indicate the size of the mountain of old engine blocks waiting in the plant's yard for recycling.

(photos: R. Koci)

Environmental Exploration involved 12,000 children

With 128 visits to children's camps, provincial parks and — for the first time — schools, Environment Ontario's Environmental Exploration program surpassed all previous records since its initiation in 1976.

During their visits, summer students trained by Environment Ontario reached nearly 12,000 children, adults and teachers in 55 schools, 30 camps, 35 parks and in eight other engagements. For the first time, eight bilingual presentations were made, principally in the Ottawa Valley area.

The aim of the Environmental Exploration program is to foster an awareness of and a concern about the environment, to encourage the appreciation of the out-of-doors and to motivate individuals of all ages to actively participate in the improvement and the protection of the environment.

The four students involved in the 1980 Exploration program achieved these aims by introducing participants to studies of the soil, of fields and forests, insects and of the aquatic habitat. With very young children they played environmental games.

People of all ages were led on nature walks, and youngsters were taught to understand the problems associated with waste management and litter. In counsellor workshops, educators were given help in the development of individual programs.

Travelling in two teams, the students covered facilities in northern and southern Ontario. During June they visited elementary schools to work with students and teachers. On weekends they conducted environmental studies and showed films in provincial parks and campgrounds. During the week the teams visited children's day and residential camps to present programs tailored to the camps located and facilities.

The Environmental Exploration program was started in 1976. In that year 21 locations were visited. Interest in the program grew rapidly and reached 79 visits in 1979. For 1981, schools, parks and camps have already requested 88 visits.

Magdalena Burges, one of Environment Ontario's bilingual summer students attached to the Environmental Exploration program teaches environmental concern to a group of children in a provincial park.

Duffin Creek serves...

(continued from pg. 4)

pumping stations lift sewage from low-lying areas along the route. Wherever possible the route has been established in consultation with local government and affected citizens.

The trunk sewers are pipes constructed in trenches or by tunnelling. In the lower reaches of the network, pipe sizes are ten feet in diameter. Upstream in the system the sewage flows in smaller pipes.

The York-Durham project is being developed as an Environment Ontario "Provincial Project". Environment Ontario is responsible for all designs and construction. The regional municipalities are operating and maintaining the works in York and Durham with the exception of the Duffin Creek Sewage Treatment Plant, which is operated by the ministry.

The Ontario Ministry of the Environment is providing a 15 per cent subsidy to underwrite capital construction costs and arranging financing through the Canada Mortgage and Housing Corporation. A provision for forgiveness in federal government municipal sewage loans subtracts a further 16 2/3 per cent subsidy from the total cost to the regions.

The provincial investment will be recovered through a service charge to the regional municipalities for all sewage treated and received. For the first few years, this charge is to be 49¢/1000 gallons of received and treated sewage. This service rate will be reviewed regularly. How the charges are passed on to the taxpayer will be determined by the regional and local municipal councils.

The future construction timetable for the trunk sewer system is:

1980 to 1981:

— Extension of trunk sewer north to Markham Rd. in Richmond Hill.

— Completion of trunk sewer from Liverpool Rd. through Scarborough and Markham to Bayview Ave.

— Completion of sewer along Steeles Ave. from Jane St. to Leslie St. and north on Leslie to the main trunk sewer.

1981 to 1986:

— Extension of sewers north from Richmond Hill to Newmarket and

— West from Jane St. along Steeles Ave. to Woodbridge.

Hydro submits class assessment

To streamline environmental assessment, The Environmental Assessment Act provides for an overall class assessment of small and frequently built structures, such as minor transmission lines, transformer stations and communication towers.

Ontario Hydro has recently submitted its environmental assessment of structures of this type to Environment Ontario, and Environment Ontario has reviewed these submissions.

Following the procedure established in The Environmental Assessment Act, Environment Ontario now invites public scrutiny of and comments to the Ontario Hydro submission and to its own review.

Environment Ontario's review does not represent a decision. It makes certain recommendations on several significant matters, such as conditions on the approval relating to the use of construction guidelines and land acquisition.

Hydro's environmental assessment describes the planning process Hydro proposes to follow when planning the following types of projects:

- New transmission lines of 115 kilovolts rating and more than 2 kilometres long.
- New transmission lines exceeding 115 kilovolts between 2 to 8 kilometres in length.
- Upgrading of transmission lines to 115 kilovolts or higher, or any length where poles are replaced and/or rights-of-way changed.
- Transformer stations of between 115 and 230 kilovolts whether on new or extended Hydro sites.
- All new communications towers.

Advertisements regarding the start of the public comment period and release of the review are being published in newspapers across the province.

Interested persons have 30 days from the date on which the advertisement appears in any newspaper to make submissions to the minister, or to require a hearing. Relevant documents are available for inspection at all regional offices of Environment Ontario and Hydro, the district offices of the Ministry of Northern Affairs, and the clerks' offices of regional municipalities and counties, Metro Toronto and the District of Muskoka.

Lorne Park — the invisible...

(continued from pg. 5)

Impurities are scoured from within the sand and coal layers and backwashed into the wash troughs. The backwash water is settled and the solids are directed to the Clarkson Water Pollution Control Plant for further processing.

Up to 225 million litres of clean, filtered drinking water are then pumped through the distribution system to residents in the western half of the Regional Municipality of Peel.

The Lorne Park Water Purification Plant and intake were financed by a $3.4 million grant from Environment Ontario and a $2.6 million grant from Canada Mortgage and Housing Corp. The remainder was financed by the Ministry of the Environment to be recovered from the Regional Municipality of Peel.

Consultants for the plant were Gore and Storrie Ltd. Pigott Construction Ltd. built the plant and Belanger Construction Ltd. constructed the intake pipe.

Sewage and water...

(continued from pg. 5)

gram of environmental protection, rehabilitation and management.

By the late sixties newly awakened public concern expanded the task of environmental protection to involve the concern for air and land.

In answer to the public demand, in 1972 the Ontario government assembled the various components of its environmental program into a single agency, the Ministry of the Environment.

Within this new organization, all existing environmental programs remained active and effective, while further new legislation was prepared, and new structures and approaches to environmental problems were established.

The protection of the province's water remained one of the main tasks of the new ministry.

New responsibilities for 4 MOE officials

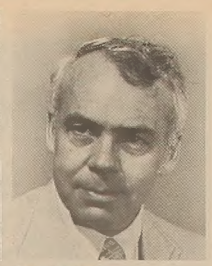
Environment Ontario announces the following executive changes: **Thomas W. Cross** is the new director of the environmental approvals branch. He was formerly director of the air resources branch. **Dennis W. Caplice** is the new director of Central Region. He was formerly director of the environmental approvals branch. **Colin Macfarlane** is the new director of the waste management branch. He was formerly director of the central region. **Len Pitura** is now director of the organization policy branch of the management board of Cabinet.

As director of the environmental approvals branch, Thomas W. Cross will head the central approval and co-ordinating agency for applications involving waste disposal sites and facilities, reclamation and recycling, and waste and sewage treatment facilities.

A major responsibility is the processing and review of environmental impact assessments required under The Environmental Assessment Act.

Thomas W. Cross

Dennis W. Caplice



Colin Macfarlane

Len Pitura

Cross joined the Ontario Government's air pollution control service in 1966 and served as director of technical services. He became assistant director and in 1978 director of the ministry's air resources branch.

Dennis Caplice will be responsible, as director of the ministry's central region, for all environmental matters in the regions of Peel, Halton, Durham, York, Simcoe, Muskoka, Haliburton, Victoria, Peterborough and Northumberland.

He joined the Ontario Water Resources Commission in 1959 and was named assistant supervisor of the industrial waste branch in 1964. In 1967 he was appointed director of that branch.

On formation of the Ministry of the Environment in 1972 he became director of the environmental approvals branch, a position he held until his recent appointment.

As director of the waste management branch, Colin J. Macfarlane will be responsible for all functions related to the management of solid, liquid and hazardous wastes.

Macfarlane joined the Ontario Department of Health in 1967 as assistant director of the air pollution control service. On formation of the Ministry of the Environment in 1972 he was appointed director, air management branch. He became director, west-central region, in 1974 and director, central region, in 1979.

Len Pitura was director of Environment Ontario's Northwestern Region from 1974 to 1977. He was appointed director of the then newly-formed waste management branch in 1978.

Clean engines burn less fuel

About 40 per cent of the 4,785 motor vehicles tested during the first half of the 1980/81 fiscal year by Environment Ontario's vehicle emission section failed the inspection.

"In most cases, the failure could be rectified by minor adjustments to the engine," said John Cann, emission test centre manager. "The rate of failures could be reduced very much if more people would realize that an environmentally dirty engine also consumes more gasoline than a clean one, and that most of the failures are simply the result of neglect."

In only 249 cases excessive emissions were caused by faults in the emission control system or by tampering with emission control devices. Owners of these vehicles were issued violation notices requiring them to rectify the situation and to report back for re-inspection.

A total of 1,979 of the tested vehicles were either brought by their owners to the ministry's automotive test centre at 1146 Castlefield Ave. in Toronto or were tested by the ministry's mobile unit operating at various locations throughout Metropolitan Toronto or on used car dealer lots. A total of 2,151 vehicles were tested during the summer months for compliance to emission standards in Ottawa, Barrie, Parry Sound, Peterborough, Guelph, Oshawa and Chatham.

It is estimated that about half of total air pollution is caused by motor vehicle emitting hydrocarbons and carbon monoxide. To comply with federal and provincial specifications, car manufacturers equip their products with one or more pollution control systems.

As the efficiency of these systems deteriorates, excessive amounts of pollutants are emitted. To control such excessive emissions, Environment Ontario has established its vehicle emission section at 1146 Castlefield. At this facility, experienced mechanics test automobiles free of charge.

No automobile is immune against failures of its emission controls. But when Don MacMillan, test inspector of Environment Ontario's vehicle emission section recently checked the exhaust of Premier Bill Davis' automobile he found it well below limits and "very clean." (photo: R. Koch)

VEHICLE EXHAUST EMISSION LEVELS

1. ENGINES NOT MORE THAN 2.29 LITRE DISPLACEMENT (2294 C.C./140 CID)

Model Year	Carbon Monoxide (CO) % Volume		Hydrocarbons (HC) ppm
	Idle	Fast Idle*	Idle and Fast Idle
PRE 1969	6.0	5.0	800
1969	5.0	3.0	600
1970/1971	4.0	2.5	500
1972/1974	3.5	2.0	500
1975/Newer	2.5	1.5	400

2. ENGINES MORE THAN 2.29 LITRE DISPLACEMENT

Model Year	Carbon Monoxide (CO) % Volume		Hydrocarbons (HC) ppm
	Idle	Fast Idle*	Idle and Fast Idle
PRE 1969	5.0	3.0	600
1969	4.0	2.0	500
1970/1971	3.0	1.5	400
1972/1974	2.5	1.0	400
1975/Newer	2.0	1.0	300

*2450/2550 RPM

Old Waste sites under study

Studies are under way on 192 old waste sites across Ontario to determine whether they contain any wastes that may be dangerous to public health or to the environment.

The sites were identified in a province-wide search of historical records and local memories. The search found 1,450 old sites. Of these, 491 were not officially recorded. A total of 192 were selected as a first group to be studied.

"The sites were chosen on the possibility, however remote, of problems in their environment," Colin Macfarlane, director of Environment Ontario's waste management branch, said. "We are working in many cases on memories of practices 10, 15 or more years ago before the province took over regulatory control. This study will sort the wheat from the chaff and tell us which sites, if any, are really worth a further investigation."

At this stage, the program is a precaution dictated by prudence. There is no evidence that problems exist at any of the sites.

The municipalities concerned have been advised of the study and will be kept informed on its progress. The study is based on a preliminary report, available from Environment Ontario, Information Services Branch, 135 St. Clair W., Toronto, M4V 1P4.